

Remarks/Arguments

The Office Action of September 1, 2005 and the references cited therein have been carefully studied and reviewed, and in view of the foregoing Amendment and following representations, reconsideration is respectfully requested.

1. The Objection to the Disclosure

The term “Decap” objected to by the Examiner is a term of art as is evidenced by the fact that such term can be found in numerous patents in the collection of semiconductor art maintained by the U.S. Patent and Trademark Office. For example, refer to U.S. Patent No. 6,809,395, U.S. Patent No. 6,806,104, or U.S. Patent No. 5,756,390. In particular, those of ordinary skill in the art understand the term “Decap” to refer to a process of removing a targeted layer, such as an oxide layer, a nitride layer or the like, from a substrate. Accordingly, no further explanation of the term “Decap” needs to be provided in the specification and the objection to the disclosure should thus be withdrawn.

2. The Claim Rejections Under 35 USC 112, second paragraph

The rejection of claims 2 and 8 under 35 USC 112, second paragraph, is most strenuously traversed. Claim 2 recites steps of **preparing a cleaning solution** comprising hydrogen fluoride (HF), ammonium fluoride (NH₄F) and de-ionized water (H₂O); and **exposing a portion of a substrate to the cleaning solution**. These two steps alone are sufficient to effect a cleaning of the substrate. Likewise, claim 8

recites steps of **preparing a cleaning solution** comprising hydrogen fluoride (HF), ammonium fluoride (NH₄F) and de-ionized water (H₂O); **and dipping the substrate into the cleaning solution.**

Therefore, it is simply not understood what the Examiner means by the claims being incomplete as not setting forth steps by which a substrate could be cleaned.

Regarding claims 3 and 9, these claims have been amended to correct an obvious word processing error.

Claim 14 has been amended to obviate the criticism thereof raised by the Examiner.

Regarding claim 16, the rejection thereof based on the use of the term “Decap” is traversed for the same reasons given above with respect to the Examiner’s objection to the disclosure.

Regarding claim 17, the Examiner’s criticism of the preamble of the claim is simply not understood. As explained in paragraphs [0025] and [0030] of Applicants’ original specification, as is well-known in the art, *per se*, monitoring substrates and dummy wafers are used in a semiconductor device manufacturing process, namely a deposition process, for monitoring the deposition process and providing feedback by which the process can be improved. Also, as is well-known in the art, *per se*, monitoring substrates and dummy wafers should be regenerated, i.e., recycled, using a Decap process. The steps recited in the body of claim 17 are all applicable to a Decap process and thus, are clearly useful in the method of manufacturing semiconductor

devices. Therefore, one of ordinary skill in the art would find nothing in accurate or indefinite about the preamble of the claim.

On the other hand, to expedite prosecution, the body of claim 17 has been amended to delete the term “a said nitride layer” that confused the Examiner.

3. The Rejection of the Claims as being obvious under 35 USC 103 in view of U.S. Patent No. 5,972,123 to Verhaverbeke

Each of claims 1, 2, 8, 14 and 17 has been amended to recite a cleaning solution, or preparation of a cleaning solution, that is especially adept at removing a nitride layer from a substrate. In particular, the cleaning solution comprises from about 10% to about 35% by weight of hydrogen fluoride (HF), from about 10% to about 35% by weight of ammonium fluoride (NH₄F) and from about 30% to 80% by weight of de-ionized water (H₂O) based on a total amount of the cleaning solution, **and the percent by weight (wt%) of the hydrogen fluoride (HF) exceeds that of the ammonium fluoride (NH₄F).**

The amendments to the claims are supported by Table 1 on page 16 of Applicants' original specification. In particular, Table 1 showed that cleaning solutions having HF, NH₄F and H₂O and wherein the wt% of the HF exceeded that of the NH₄F were able to etch a nitride layer at nearly twice the rate of cleaning solutions having HF, NH₄F and H₂O but wherein the wt% of the HF did not exceed that of the NH₄F.

Although Verhaverbeke discloses a cleaning solution that comprises HF and NH₄F, Verhaverbeke does not disclose any example of such a cleaning solution wherein the wt% of the HF exceeds that of the NH₄F.

In rejecting Applicants' claims, the Examiner takes the position that the present invention merely represents the optimization through routine experimentation with the wt% ratios of the solutions disclosed by Verhaverbeke. In support of his position, the Examiner cites In re Boesch, 205 USPQ 215.

However, a "particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimization or workable ranges of said variable might be characterized as routine experimentation". MPEP 2144.05 citing In re Anotnie, 559 F.2d 618, 95 USPQ 6 (CCPA 1977).

Nowhere does Verhaverbeke specifically recognize that the etching rate of a nitride layer is affected by the ratio of the wt% of the HF to the NH₄F in a cleaning solution comprising HF, NH₄F and H₂O. Moreover, Verhaverbeke only discloses examples in which the HF: NH₄F ratio varies between 10% and 100%, i.e., between 0.1:1 and 1:1 in direct contrast to Applicants' claimed invention.

Therefore, Applicants' claimed invention, wherein the wt% of the HF exceeds that of the NH₄F in the cleaning solution, can not be considered as being derived through routine experimentation of what is taught by Verhaverbeke, i.e.,

Applicants' claimed invention is not obvious under 35 USC 103 in view of the teachings of Verhaverbeke.

Accordingly, early reconsideration and allowance of the claims are respectfully requested.

Respectfully submitted,

VOLENTINE FRANCOS & WHITT, PLLC

By:

MS *Reg No 33283*
Michael Stone
Reg. No. 32,442

For:

One Freedom Square
Suite 1260
11951 Freedom Drive
Reston, VA 20190
Tel. (571) 283-0720
Fax (571) 283-0740

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